

Lesson 5



Cowbird fledgling

Habitat Change and Variations within Populations

Lesson 5 builds on the idea of variations in an animal population, showing students how a variation in one individual can be an advantage due to a change in the animals' environment. In this lesson, students learn that cowbirds lay their eggs in other birds' nests.

This lesson focusses on variations in an animal population. It introduces a discussion of how human-caused changes to the environment can affect variations in characteristics among individuals within a population. It uses the example of cowbirds to show

how a variation in one individual can be an advantage due to a change in the animal's environment. In this lesson, students return to concept presented in *Adapted to Woodlands*, that cowbirds lay their eggs in other birds' nests. They view photographs

of several of the bird species whose nests are parasitized by cowbirds, discuss characteristics of the eggs and young of these species; and, read about how these different species react to the cowbirds. They consider habitat changes that might affect cow-

Learning Objective

Provide examples of the effects of human-caused changes to the environment on the characteristics or variations among individuals within a population.

Provide examples of variations among individuals within a population that are caused or influenced by the environment.



the expense of their own young, not all cowbird young survive.

Individuals of some host species have a trait that causes them to reject the cowbird eggs.

With increased pressure being placed on habitats, some host species that had accepted and raised cowbird eggs in the past have developed a trait that causes them to reject cowbird eggs. This trait has begun to spread throughout the population in only a few generations. Once an entire population inherits the variation, it becomes a trait of that species in that environment—an adaptation—which will help more individuals to survive.

birds and the birds whose nests they parasitize. They discuss what happens to the cowbird eggs when some host birds develop the inherited trait of rejecting them and what advantages this has for the host bird's own young.

Background

As human communities expand, ecosystems change. Some changes are temporary; other changes may permanently affect the functioning of the natural system. Riparian woodlands, habitat along the banks of freshwater streams, rivers, and lakes, are threatened by human activity. These riparian habitats are vital to California. More species of birds nest there than in any other plant community. Some 140 species use the state's riparian habitat for breeding, nesting, or as a resting spot during migration. They feed on the multitude of insects the water supports. Much of this habitat has been disturbed or degraded; less than five percent of the riparian habitat existing when California became a state remains today. Many of these woodlands have been replaced by orchards and pasture land.

The loss of riparian habitat has led to a decline in the populations of many species of birds. Populations once abundant are down due partly to the loss of riparian habitat and partly

to the brown-headed cowbirds that parasitize nests.

Cowbirds thrive in the altered riparian habitat. The females inherit aggressive behavior, often pushing an egg out of a nest before replacing it with their own. Their parasitic behavior saves using limited resources to care for their own young. When grown, cowbirds, a kind of blackbird, flock with cowbirds and other blackbird species. Much is unknown about cowbird-host interaction. While many birds will raise the cowbird hatchlings at

Key Vocabulary

Individual: One member of a group.

Reject: To refuse or turn down.

Riparian: Relates to an area on or near a river bank.



Yellow warbler feeding cowbird fledgling

Toolbox



Summary of Activities

Students discuss how humans affect riparian habitats. They view photographs and talk about how host species treat cowbird eggs. They discuss how some birds have inherited a trait that causes them to care for only their own young.



Instructional Support

See Unit Resources, page 24

Prerequisite Knowledge



Students should know about:

- animal life cycles, including reproduction.
- birds hatching from eggs.

Advanced Preparation



Gather and prepare Activity Masters.

Gather and prepare Materials Needed.

Gather and prepare Visual Aids:

- Prepare transparencies.



Materials Needed



A-V equipment:

- Overhead or LCD projector, screen

Class supplies:

- Pencils

Visual Aids



Transparencies:

- **Healthy Riparian Habitat**, Visual Aid #8
- **Disturbed Riparian Habitat**, Visual Aid #9
- **Cowbird**, Visual Aid #10
- **How Red-winged Blackbirds Treat Cowbird Eggs**, Visual Aid #11
- **How Yellow Warblers Treat Cowbird Eggs**, Visual Aid #12

Duration



Preparation Time

15 min.

Instructional Time

45 min.



Safety Notes

None

Activity Masters in the Supporting Materials (SM)

Taking Care of Our Own

SM, Page 22
One per student

Procedures

Vocabulary Development

Use the **Unit Dictionary** and the **Vocabulary Word Wall Cards** to introduce new words to students as appropriate. These documents are provided separately.

Step 1

Remind students that they have been studying about characteristics or traits that animals inherit from their parents, such as their size or the color of their coat. These characteristics are common to an entire species.

Explain that sometimes when something in an environment changes, for example if trees are cut down or a food source is reduced, some individuals in a population may change their behavior or appearance as a means of surviving in the new situation. This change gives them a better chance to survive and reproduce. Over time, this change, or variation, can be passed on to other generations.

Step 2

Project the transparency of the **Healthy Riparian Habitat** (Visual Aid #8). Explain to students that “riparian” describes an area on or near the banks of rivers and streams. Point out the river bank, the shrubs and the woodland. Project the transparency of a **Disturbed Riparian Habitat** (Visual Aid #9). Ask the following questions:

- How are these two habitats different?” (*The riverbank in the disturbed habitat has few plants and there are fewer trees there.*)
- Do you think that there were more birds in the first riparian habitat photograph or the second? Why? (*The first because there were more trees where the birds could rest.*)

Step 3

Tell students that more species of birds nest in riparian habitats than in any other plant community. Explain that many bird species use California’s riparian habitat for breeding, nesting, or as a resting spot during migration. But that much of this habitat has been disturbed or degraded. Write 100 % on the board Next to it write 50 % and 5%. Ask students, “Which number do you guess is closer to how much riparian habitat still exists compared to when California became a state?” (*Note: While there may be several guesses, the correct answer is 5%*). Explain that much of these woodlands have been replaced by orchards and pasture land.

Step 4

Project the transparency of the **Cowbird** (Visual Aid #10). Remind students that cowbirds lay eggs in other bird’s nests. Some birds accept the eggs, hatch them, and raise the hatchlings. Others reject the eggs, may push them out of the nest or do not feed the young. Ask students, “Which birds—those that accept or those that reject the eggs—have a better chance of raising their own young?” Accept all answers and tell students that they will learn the answer by the end of the lesson.



Step 5

Project the transparency of **How Red-winged Blackbirds Treat Cowbird Eggs** (Visual Aid #11). Identify the red-winged blackbird and the cowbird. Have students look at the eggs. Ask students, “Which egg is different? Which one is the cowbird egg?” Instruct them to look at the two hatchlings shown in the photograph. Have students take turns reading the text. Help students with words that may not recognize. Emphasize whether or not the red-winged blackbird accepts the cowbird eggs. Ask the following questions:

- Are the cowbird’s eggs bigger, smaller, or the same size as the red-winged blackbird’s eggs? (*The same size*)
- Are the cowbird hatchlings bigger or smaller than the red-winged blackbird hatchlings? (*Bigger*)
- How are the eggs different? (*The cowbird’s eggs are speckled.*)
- Do red-winged blackbirds accept cowbird eggs and hatchlings as their own? (*Most of them do.*)
- What variation did some of the individual red-winged blackbirds inherit? (*Some do not accept the cowbird eggs. They push them out of the nest.*)
- Why would this variation be important to red-winged blackbirds? (*It leaves more food for their hatchlings. More red-winged blackbirds can survive and reproduce.*)

Step 6

Project the transparency **How Yellow Warblers Treat Cowbird Eggs** (Visual Aid #12). Have students look at the eggs. Ask students, “Which egg is different? Which one is the cowbird egg?” Tell them to look at the yellow warbler with its nest. Have students take turns reading the text. Help students with words that may not recognize. Emphasize whether or not the yellow warbler accepts the cowbird eggs. Ask the following questions:

- Are the cowbird’s eggs bigger, smaller, or the same size as the yellow warbler’s eggs? (*Bigger*)
- Are the cowbird hatchlings bigger or smaller than the yellow warbler hatchlings? (*Bigger*)
- Are the cowbird hatchlings bigger or smaller than the yellow warbler parents? (*Bigger*)
- How are the eggs the same? (*They are both speckled.*)
- Do yellow warblers accept cowbird eggs and hatchlings as their own? (*Most of them do accept the eggs.*)
- What variation did some of the individual yellow warblers inherit? (*Some will bury the cowbird egg with weeds. Some do not sit on the cowbird egg so it will not hatch.*)
- Why is this variation important to yellow warblers? (*Yellow warblers with this variation may raise more offspring, that in turn grow to adulthood and produce offspring of their own because they have this variation.*)

Step 7

Remind students that they have been looking at a variation or difference in a usual trait, in this case how bird’s behavior varied so that their offspring would survive rather than the cowbird’s offspring. Ask students, “Why is this important?” (*More of the birds who are supposed to live in the nest will survive and be able to have young.*)

Step 8

Distribute copies of **Taking Care of Our Own** (Lesson 5 Activity Master). Review the quiz questions with the students. Have students answer the quiz and collect it for scoring when they are finished.

Lesson Assessment

Description

Lesson 5 teaches students to provide examples of variations among individuals within a population that are influenced by the environment or caused by human activity. Class discussions in Steps 2 and 3 reflect students' understanding of human-caused changes to the environment. Responses to questions about photographs that depict how various birds accept or reject cowbird eggs demonstrate students' understanding of variations of characteristics related to the environment. Completion of **Taking Care of Our Own** (Lesson 5 Activity Master) demonstrates students' understanding that both the environment and human activity can affect characteristics or variations among individuals within a population.

Suggested Scoring

Use the Answer Key provided on page 79 to score **Taking Care of Our Own**. Each question is worth five points, for a possible total of 20 possible points.

Answer Key and Sample Answers

Taking Care of Our Own

Lesson 5 Activity Master

Name: _____



1. What changes to a host bird's habitat can change what it does with cowbird eggs?

People cut trees to build more houses. There might not enough food and shelter for the other birds, so they only raise their own young.

2. What trait do some birds inherit that is not good for cowbirds?

They do not take care of the cowbird's eggs.

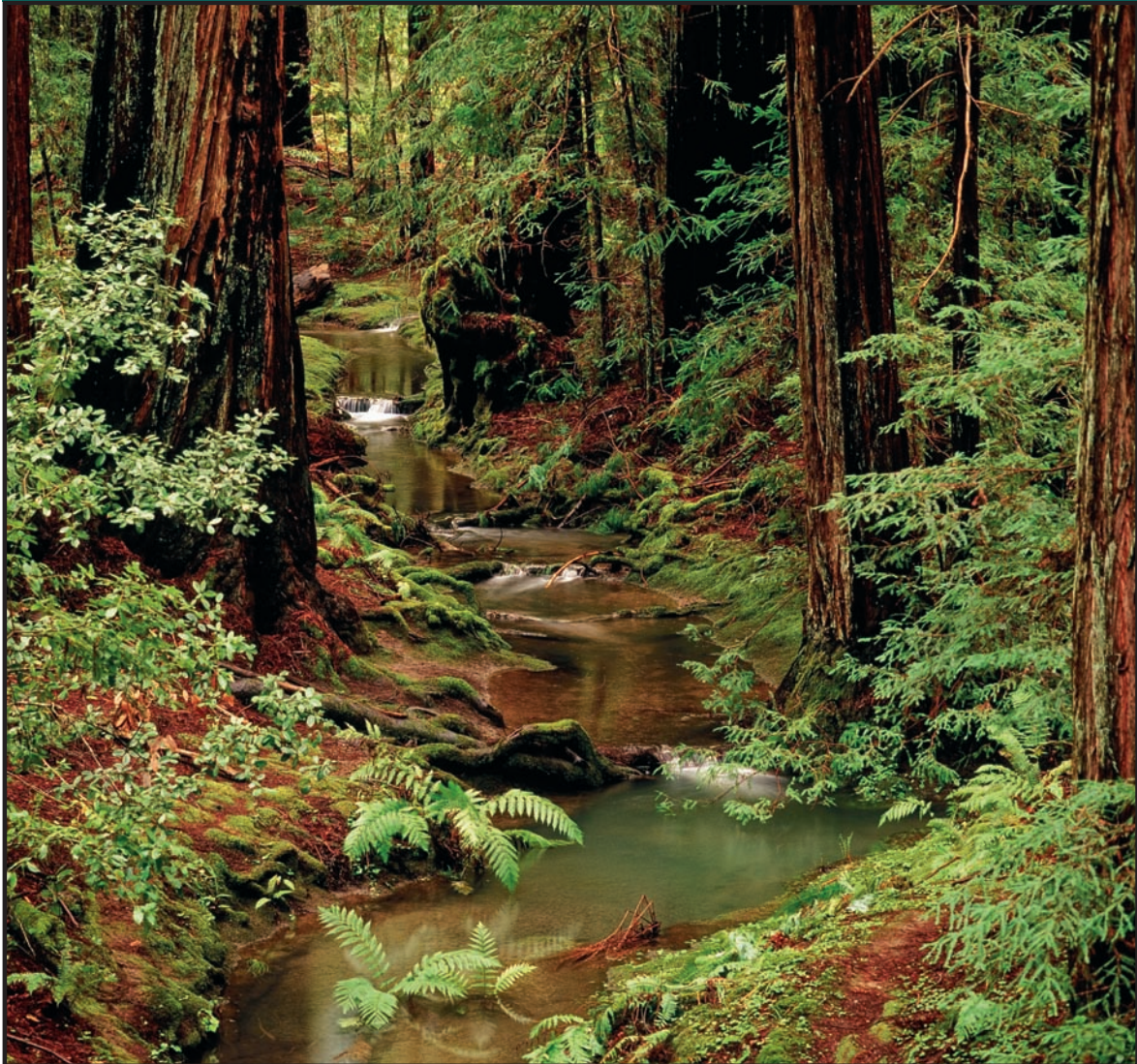
3. What are two ways that birds reject cowbirds?

The birds may push the eggs out of the nest, abandon the nest, bury the cowbird eggs, not sit on the eggs to keep them warm.

4. How does this trait help other birds?

They will have enough food for her own young. They will have a better chance to grow to adulthood and produce their own young reproduce.

Healthy Riparian Habitat



9

Disturbed Riparian Habitat

Visual Aid — Transparency

Disturbed Riparian Habitat

10

Cowbird

Visual Aid — Transparency

Cowbird



11

How Red-winged Blackbirds Treat Cowbird Eggs

Visual Aid — Transparency

Cowbird Eggs



Cowbirds and red-winged blackbirds are both in the blackbird family.

Their eggs are the same size. But cowbird eggs have more speckles.

Almost all red-winged blackbirds accept cowbird eggs.

They raise cowbird hatchlings along with their own.

A few red-winged blackbirds inherited a variation.

Some blackbirds reject cowbird eggs.

This lets red-winged blackbirds raise more of their own young.



Here are three red-winged blackbird eggs and two cowbird eggs. Which is which?



Red-winged blackbird hatchling



Cowbird hatchling

Cowbird Eggs



Cowbird eggs are bigger than yellow warbler eggs.
Cowbird hatchlings are even bigger than the yellow warbler parents!
Most yellow warblers will raise cowbird hatchlings as their own.
A few yellow warblers inherit a variation.
These warblers bury the cowbird egg with weeds and grass.
When they sit on their nests, they do not keep the cowbird egg warm.
The cowbird eggs do not hatch.
Warblers with this variation may raise more offspring.
They may pass the variation onto their offspring.